

What is Claimed Is:

1. A control solenoid apparatus comprising:
a valve body having a first longitudinal cavity on a first axis, a second longitudinal cavity on a second axis different from the first axis, and a third longitudinal cavity traversing the first and second longitudinal cavities;
a spool valve slidably positioned in the first longitudinal cavity, and wherein movement of the spool valve acts on a fluid contained in the third longitudinal cavity; and
a solenoid positioned in the second longitudinal cavity, the solenoid having an actuator slidably positioned on the second axis, and wherein movement of the actuator acts on the fluid contained in the third longitudinal cavity.
2. The apparatus according to claim 1, wherein the first axis and the second axis are substantially parallel to one another.
3. The apparatus according to claim 1, further comprising:
a valve arranged in an opening between the second longitudinal cavity and the third longitudinal cavity, and configured to communicate a force created by the movement of the actuator to the fluid contained in the third cavity.
4. The apparatus according to claim 1, including an end cavity bounded by a first end of the spool valve and an end of the first longitudinal cavity.
5. The apparatus according to claim 4, further comprising a pressure sensor positioned in the end cavity.
6. The apparatus according to claim 5, wherein the pressure sensor is configured to detect change of fluid pressure contained in the end cavity caused by movement of the spool valve.

7. The apparatus according to claim 5, wherein the valve housing further comprises a supply port, a control port, and an exhaust port, each being fluidly coupled to the first longitudinal cavity.

8. The apparatus according to claim 7, wherein the movement of the spool valve in a first direction progressively opens the supply port and closes the exhaust port and movement of the spool valve in a second direction progressively closes the supply port and opens the exhaust port.

9. The apparatus according to claim 7, wherein fluid from the control port flows in and out of the end cavity in response to movement of the spool valve.

10. The apparatus according to claim 9, wherein the spool valve is shaped generally to conform to a shape of a wall bounding the first longitudinal cavity, the spool valve having a groove in its outer surface forming a peripheral cavity bounded by a surface of the groove and the wall of the first longitudinal cavity.

11. The apparatus according to claim 10, wherein the end cavity and peripheral cavity are fluidly coupled to one another.

12. The apparatus according to claim 10, wherein the spool valve comprises a feedback channel fluidly coupling the end cavity and the peripheral cavity to one another.

13. The apparatus according to claim 11, wherein the control port is fluidly coupled to the peripheral cavity.

14. The apparatus according to claim 9, wherein the exhaust port is variably and fluidly coupled to the peripheral cavity.

15. The apparatus according to claim 14, wherein movement of the spool valve in a first direction progressively closes the exhaust port with respect to the peripheral cavity and movement of the spool valve in a second direction progressively opens the exhaust port with respect to the peripheral cavity.

16. The apparatus according to claim 1, wherein the spool valve further comprises:

an inner longitudinal cavity formed in the spool valve having a first open end at a an end of the spool valve enabling fluid flow between the inner longitudinal cavity and the third longitudinal cavity.

17. The apparatus according to claim 16, wherein movement of the spool valve in a first direction causes the fluid to flow from the inner longitudinal cavity to the third longitudinal cavity and vice-versa.

18. The apparatus according to claim 1, further comprising an electrical controller electrically connected to the solenoid.

19. The apparatus according to claim 18, further comprising a pressure sensor positioned at a first end of the first longitudinal cavity.

20. The apparatus according to claim 19, where the pressure sensor connects to the electrical controller for processing pressure readings.